

A 10/30/90 54698260  
New claims: What <sup>I c</sup> is <sup>I</sup> claimed is:

1. A method for detecting CDMA-coded signals  $\underline{d} = (\underline{d}^{(1)}, \dots, \underline{d}^{(K)})$ , where  $\underline{d}^{(k)} = (\underline{d}_1^{(k)}, \dots, \underline{d}_M^{(k)})$ ,  $k = 1, \dots, K$ , characterized in that the method comprises the following steps:

- a) determining a first detection solution  $\hat{\underline{d}}(1)$  of CDMA-coded signals  $\underline{d}$ ;
- b) determining an  $(n+1)$ -th detection solution  $\hat{\underline{d}}(n+1)$  for  $n = 1, \dots, N$  as a function of the  $n$ -th detection solution  $\hat{\underline{d}}(n)$  by assigning

$$\hat{\underline{d}}(n+1) = f(\hat{\underline{d}}(n))$$

where iteration for  $n \rightarrow \infty$  converges toward multiuser solution  $\hat{\underline{d}}_{MU}$ , i.e.,

$$f(\hat{\underline{d}}(n)) \xrightarrow{n \rightarrow \infty} \hat{\underline{d}}_{MU},$$

- c) if the quality of approximation solution  $\hat{\underline{d}}(n+1)$  is not sufficient, assigning  $n \rightarrow n+1$  and continuing the procedure with step b);
- d) if the quality of solution  $\hat{\underline{d}}(n+1)$  is sufficient, terminating the procedure and using

$\hat{\underline{d}}(n+1)$  as the estimate of data  $\underline{d}$  to be detected,

- e) the function of step b is given by

$$f(\hat{\underline{d}}) = \hat{\underline{d}} + \delta \cdot \underline{g}$$

with

$$\delta = \frac{\|\underline{g}\|^2}{\|\underline{A} \cdot \underline{g}\|^2} \text{ and } \underline{g}^T = \underline{A}^H \cdot (\underline{s}^T - \underline{A} \cdot \hat{\underline{d}}^T)$$

where matrix A is given by

$$A = \begin{bmatrix} b^{(1)}_1 & 0 & \dots & \\ \vdots & \vdots & & \\ b^{(1)}_Q & 0 & & \vdots \\ \vdots & b^{(1)}_1 & & \\ b^{(1)}_{Q+W-1} & \vdots & & 0 \\ 0 & b^{(1)}_{Q+W-1} & & b^{(K)}_1 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \dots & b^{(K)}_{Q+W-1} \end{bmatrix}$$

with  $\underline{b}^{(k)} = \underline{c}^{(k)} * \underline{h}^{(k)}$ ,

where  $\underline{c}^{(k)}$  denotes the K different codes and  $\underline{h}^{(k)}$  denotes the pulse responses of the K different linear transmission channels.

2. The method according to Claim 1, characterized in that the method converges toward the solution of the zero forcing block linear estimator for  $n \rightarrow \infty$ .
3. The method according to one of the preceding claims, characterized in that symbols  $d^{(k)}$  to be transmitted assume values of  $\pm 1$  or  $\pm i$ .
4. The method according to one of the preceding claims, characterized in that solution  $\hat{\underline{d}}^T(n) = A^H \cdot \underline{s}^T$  of the RAKE receiver is used as the 1-st detection solution for starting the iteration.
5. The method according to one of Claims 1 through 3, characterized in that the first detection solution for starting the iteration is set to zero.

6. A device for carrying out the method according to one of Claims 1 through 5, characterized in that the device has a data estimator (4) for determining a first detection solution, an estimate improver (5) for determining an improved detection solution and a decision circuit (6) for deciding whether to continue the iteration.

7. The device according to Claim 6, characterized in that the estimate improver (5) has a unit (9) for calculating an estimated transmission signal, a unit (11) for calculating standardized approximation term  $\delta \cdot \underline{g}$  and an adder (15) for calculating the improved estimate.

8. The device according to Claim 7, characterized in that the unit (11) for calculating standardized approximation term  $\delta \cdot \underline{g}$  has a unit (12) for calculating approximation term  $\underline{g}$ , a unit (13) for calculating standardization factor  $\delta$  and a multiplier (14) for calculating the standardized approximation term.

09786945-061301  
FOET90-54698460

Add A'